

REMARKS

Claims 1 to 20 are in this application and are presented for reconsideration. By this Amendment, Applicant has amended claims 1 to address issues raised in the Office Action by clarifying the important combination of features which define over the prior art of record.

Applicant respectfully makes assertions for overcoming the rejections of the outstanding Office Action dated # in the following paragraphs.

Claim Rejections - 35 U.S.C. §103

Claims 1 to 9, 12 to 15, and 17 to 20 have been rejected under 35 U.S.C. §103(a) as being unpatentable over the U.S. Patent No. 5,551,627 to Leicht et al. (the "Leicht '627" reference, hereinafter) and further in view of the U.S. Patent No. 4,404,453 to Gotman (the "Gotman '453" reference, hereinafter).

The Patent Office takes the position that the Leicht '627 reference discloses the process for producing a contact structure for connecting two substrates comprising the steps of applying solder material to terminals to form spacing metallizations, and bonding the first substrate to the second substrate, wherein the solder has a spherical shape.

This is based on the proposition by the Patent Office that "an adhesive compound is applied to the solder", which is alleged to be disclosed in column 4, lines 40 to 51 of the Leicht '627 reference.

However, there is no hint to an adhesive compound being applied to the solder but to fillets 212 and 214 being in a tapered form in order to generate a cross-sectional area as small

as possible between the fillet material and the spherical preform 210.

Beyond that the fillet material is a metal alloy solder being comparatively less compliant than the metal alloy solder that comprises the spherical preform 210 (column 4, lines 29 - 30). In order to connect the fillets with the spherical preform 210, there is used a reflow heating up to a temperature above the melting point of the fillet material but below the melting point of the spherical preform 210 for a period of about 15 to 60 seconds (column 5, lines 9 to 12).

During this time period, indium from the spherical preform 210 dissolves into the solder paste 312 (the fillet material), now in a molten state, thereby improving the compliance of the fillet material by migration of indium, which means a diffusion of process (column 5, lines 19 to 24).

From the afore-mentioned process description, it becomes clear that there is no melting at all of the solder preform forming a spacing metallization. Thus, a man skilled in the art takes from the Leicht '627 reference, the teaching to use a spacing metallization without any melting of the spacing metallization, not even partially.

Based on the Leicht '627 reference, accordingly, there has been no reason at all for the man skilled in the art to look for another document, for example, the Gotman '453 reference, whose subject matter is a melting action of spherical preforms (solder globules 72) in order to connect a first and second substrate.

Beyond that, even suggested that the man skilled in the art would have taken into account the teaching of the Gotman '453 reference, he could not have come to the solution to

merely partially melting the solder globules 72 since the afore-mentioned document (column 4, lines 18 to 31) describe a partially melting of the solder globules 72 in a first melting step and subsequently in a second step a melting of the solder globules in their entirety as can be derived from the wording "than the solder globules on the chip become melted and fusion takes place" (column 4, lines 30 to 31).

Therefore, even taking into account a combination of the Leicht '627 reference in view of the Gotman '453 reference, there can be no suggestion for a man skilled in the art to use a solder material forming spacing metallizations and to carry out a connection between the first and second substrate by means of a merely partial fusion of the spacing metallizations.

Claims 10, 11, and 16 have been rejected under 35 U.S.C. §103 as being unpatentable over the Leicht '627 reference, in view of the U.S. Pat. No. 5,710,071 to Beddingfield et al. (the "Beddingfield '071" reference, hereinafter).

The Beddingfield '071 reference discloses forming a flip-chip semiconductor device by mounting a semiconductor die to a wiring substrate.

It is Applicant's position that the prior art as a whole including the Leicht '627 reference in view of the Beddingfield '071 reference neither teaches nor suggests the present invention as claimed. As stated above, the Leicht '627 reference does not provide any suggestion or motivation which would lead a person of ordinary skill in the art to believe that melting of the solder preform forming a spacing metallization would lead to a different solution from the disclosure of the Leicht '627 reference. Instead, the Leicht '627 leads a person of ordinary skill in the art to adhesive compound being applied to fillets 212 and 214

being in a tapered form in order to generate a cross-sectional area as small as possible between the fillet material and the spherical preform 210. This is completely different from the present invention as claimed.

The Beddingfield '071 reference also clearly fails to teach and fails to suggest the combination of the invention. Absent a teaching or suggestion of the important feature of the invention, the combined references clearly do not direct the person of ordinary skill in the art toward the combination as claimed.

There must be some suggestion or teaching in the prior art as a whole which would lead the person of ordinary skill in the art to provide the combination as claimed. As the prior art as a whole fails to direct the person of ordinary skill in the art toward the claimed combination, the invention should be considered not anticipated, non-obvious and thus patentable.


Therefore, Applicant finds that the Leicht '627 reference in view of the Beddingfield '071 reference do not anticipate the current invention and there is no suggestion or motivation to use the teachings of the references to provide the combination as claimed.

As the prior art fails to suggest the combination of features as claimed, Applicant respectfully requests that the Examiner favorably consider the claims as now presented in view of the discussion above. Applicant respectfully solicits allowance of this application.

It is applicant's position that all claims are now allowable. Should the Examiner determine that issues remain that have not been resolved by this response, the Examiner is requested to contact Applicant's representative at the number listed below.

Favorable action is requested.

Respectfully submitted
for Applicant,

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